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ACCENT-MIXTURE AND SOUND-CHANGES

1. GENERAL

No problems of Germanic philology have been more frequently discussed than those connected with the nature and the cause of the consonant-shifts and umlaut. There are at present two different explanations of umlaut, the Wundt-Wilmanns theory of psychic anticipation, and the assimilation theory of Sievers, whereby the intervening consonant was assimilated to the following vowel, and the accented vowel then assimilated to the consonant. These are both merely attempted explanations of the *nature* rather than of the *cause* of the phenomenon. Prokosch in his *Sounds and History of the German Language*, p. 146, maintains that umlaut is non-Germanic, and due to Celtic influence. The consonant-shifts have generally been explained as the result of an increase in the force of expiration. Hans Meyer, *ZfdA* XLV, 101 ff., attributes this increase to migration into a mountainous region. Prokosch has emphasized also the element of muscular tension by the side of intensity of expiration, but he says on p. 96 of his book: "of the two factors, the intensity of expiration is the primary, the muscle tension the secondary one." He uses the expression 'strengthening of articulation' to include these two opposing factors, and explains the phenomenon as an inherent phonetic tendency of Germanic speech.

I should like to present here a theory according to which all these phenomena are explained as the result of the mixing of two different types of accent, the Nordic (North German) and the Alpine (in its purest form, French). This view eliminates entirely increase of expiration as a *positive* factor in *causing* consonant shifting, and reduces the whole problem to one of *antagonistic muscular reaction*. It also asserts that the Germanic and High German consonant-shifts are in their origin identical with Celtic *lenition*, i.e., they were all three brought about by the same cause. Feist, *PBB* 36, 307 ff., claims identity of origin for the Celtic and High German shifts, but excludes the Primitive Germanic shifts. Furthermore, he offers no physiological basis for his contention. My theory is quite different from Feist's. Pedersen, *Kelt. Gram.* § 303, raises the question as to whether there may not be some connection

between the Celtic and Primitive German shifts of *p t k*. Kretschmer, *Einleitung in die Gesch. der griech. Sprache*, p. 123, and Ginneken, *Principes de Linguistique psychologique*, both attribute the Primitive Germanic consonant-shifts to Celtic influence; but here again my theory is different. It does not seem probable that one language should influence the phonology of a neighboring language. Sound-changes are either spontaneous, or the result of real race and language mixture, i.e., the imposing of a new language on a people, and I am inclined to believe that the latter is by far the more important factor, although I do not wish by any means to deny the occurrence of spontaneous sound-changes. Umlaut, as well as consonant-shifting, can be best explained as the result of race and accent mixture, although the physiological factor involved in umlaut is not one of antagonistic muscular reaction, but a different one, which will be explained later. Before discussing the consonant-shifts, a few preliminary remarks are necessary.

2. ANTAGONISTIC MUSCULAR REACTIONS

All the muscles of the body are arranged in pairs, each of which may be looked upon as the antagonistic muscle of the other. When one of the pair is innervated, or contracted, there is a simultaneous inhibition, or relaxation, of the opposite muscle; e.g., when we raise the arm, the flexors are contracted and the extensors are correspondingly relaxed; when we extend the arm, the reverse reaction takes place. Now it is a matter of common observation that, if we start to thrust the arm out very energetically, we first involuntarily draw it up by way of preparation. Any unusually strong contraction of a muscle is generally preceded by a contraction of the antagonistic muscle. (Cf. W. G. Smith, *Mind*, 1903, pp. 47 ff.) This preliminary contraction of the antagonistic muscle and the corresponding *relaxation* of the primary muscle increases the final output of energy in the main or primary reaction. On the other hand, this very energetic thrusting out of the arm is also followed by a corresponding rebound, a *relaxation* of the extensor and a re-contraction of the opposed muscle; and this antagonistic reaction which *follows* the main contraction is stronger than the *preparatory* reaction. In other words, we have a rhythmic movement in which a primary muscular contraction constitutes the dominant element of a group, being both preceded by and followed by the antagonistic reaction, which means a *relaxation* of the primary muscle. It is

in an exactly similar manner that the muscles in the larynx work: the glottis is closed and opened, the vocal cords are made tense and relaxed, by pairs of muscles which are attached to the arytenoid cartilages; and any unusually great tension of the vocal cords will be preceded by and followed by a contraction of the antagonistic muscles and the corresponding relaxation of the vocal cords and the opening of the glottis. The application of this principle to the production of speech-sounds will be made in paragraphs 3 and 7.

3. NATURE OF ACCENT

The view is still very prevalent that stress depends upon the force with which the air-current is expelled from the lungs through the larynx and mouth. A large and strong current of air issuing from the mouth, as in the case of aspirated stops, is generally called an *expiratory accent*. By the side of this theory of expiratory accent, we have Forchhammer's theory of *glottal accent*, (Cf. Jespersen, *Lehrbuch der Phonetik*, § 7.3, and Prokosch, *JEGPh.*, 11 p. 2) according to which stress is regulated by the width of the glottis; to strengthen the stress, the glottis is narrowed, to weaken it, the glottis is widened. I believe that Forchhammer has given the correct explanation of what happens in ordinary speech. Ginneken, *Linguistique psych.*, p. 292, has tried to reconcile these two theories of stress by claiming expiratory stress for consonants and glottal stress for vowels. Jespersen (§ 7.32) accepts this view with the modification that we should make the distinction not for vowels and consonants but rather for voiced and voiceless consonants. I should like to advance the view that in ordinary speech, there is no such thing as a positive and primary expiratory accent. Stress or emphasis always expresses itself in the form of some muscular contraction; in ordinary speech, the only muscles that are contracted are those of the vocal cords and the mouth, for the act of expiration itself represents the relaxing of the diaphragm; it is the negative side of the muscular act, the return to the state of repose. In singing or shouting, the expiration may be partly controlled and aided by the chest and abdominal muscles, but this is not true in speech. I believe that all stress is a matter of contraction of the vocal cords (and the coördinated muscles of the mouth), a narrowing of the glottis; that there is no conflict between this glottal accent of voiced sounds, chiefly vowels, and the so-called expiratory accent of voiceless consonants; that the latter is merely an *apparent*, not

a *real* stress of the consonant; it is rather a natural phenomenon accompanying the increased stress of the *vowel*, the unavoidable result of the antagonistic muscular reaction at the vocal cords, whereby the glottis is widened both before and after the energetic primary contraction. The real muscular energy, or the culmination of the contraction, falls primarily on the vowel of the syllable, i.e., on the vocal cords and the coördinated mouth muscles. In speech we do not pronounce isolated consonants; we pronounce them only in connection with a vowel. If for any reason the syllable stress is very strong, i.e., if the vocal cords are made very tense for the vowel, there will appear both before and after this primary contraction an antagonistic reaction, resulting in a widening of the glottis, and this widening permits a stronger current of air to escape into the mouth than would escape if the syllable were not so strongly stressed. In pronouncing with a strong accent such a syllable as *pat*, the larger quantity of air which escapes through the glottis during the two periods of antagonistic muscular reaction is banked up in the mouth, first at the lips and again at the tongue and teeth, and upon the breaking of each occlusion it rushes out, producing what is generally called an aspirated consonant. It is not correct, then, to say, as is often said, that the increased intensity of expiration forces the glottis open. The stronger air-current is not the *cause*, but the *result* of the widened glottis. When the lungs are filled (and we have to keep them fairly well filled for speaking), the air is always present under pressure, ready to rush out just in proportion as the glottis is opened.

4. COÖRDINATION OF MUSCULAR REACTIONS

So far, I have spoken only of the muscles in the larynx; but all ordinary speech-sounds, except the glottal stop, include also mouth articulation, i.e., contraction of the muscles of the tongue, lips, soft palate or jaw. Of course, the number of possible combinations is very great, but *within any given set* there is always a definite coördination between the reactions of the muscles in the larynx and in the mouth. In the act of articulation, the organism operates as a whole. For example, in any vowel there is a normal coördination between the muscular tension of the vocal cords and that of the tongue and lips, and any change in the degree of tension of the cords will be accompanied by a corresponding change in the tongue and lip tension. (See author, *JEGPh.*, 16, 168 ff.). Simi-

lar coördination exists in the consonants. There are four main groups of consonant articulation, stops and spirants both voiceless and voiced: $p\ t\ k$, $b\ d\ g$, $f\ p\ \chi$, $\bar{b}\ \bar{d}\ \gamma$. Now it is possible to pronounce any of these sounds with varying degrees of muscular tension, i.e., there are certain maximum and minimum degrees of tension within which a consonant may vary without losing its identity, but at the minimum stage it is likely to be misunderstood, or incorrectly heard, especially by one not familiar with that type of weakened articulation, as in the case of race-mixture, and such a person is likely to substitute for it the suggested sound of a different articulation set. This will be made clear in the remainder of this section and in paragraph 7. Let us examine first the voiceless stops $p\ t\ k$. (Tension of the vocal cords is not necessarily accompanied by their vibration.) The French manner of articulating voiceless stops, as pure fortis with tense lip and tongue muscles and no accompanying aspiration, may for purposes of comparison be taken as a sort of *ideal* or *theoretical* norm, representing the maximum of tension of this group. It has been fairly well shown by the experiments of Zünd-Burguets and Seydel (cf. Jespersen, *Lehrbuch*, § 6.73) that such stops are accompanied by a closed glottis; hence the absence of aspiration. If the muscular tension at the vocal cords and in the mouth be reduced a little, we have the voiceless lenes, as in South German $\bar{p}\ \bar{t}\ \bar{k}$; in these the glottis is a little wider, and the lip and tongue contact less tense than in the pure fortis. The third degree of reduction results in the aspirated stops, as in North German, English, and Danish; in these the glottis is still more open, about in the *h*-position, and the lip and tongue contact is less tense than for the voiceless lenes. (Cf. Rousselot, *Principes de Phon. exper.*, p. 597 ff.) The Danish aspirated stops represent the extreme form of this stage. The fourth degree of reduction of muscular tension results in a wider glottis and a lip or tongue contact so light that one could scarcely say whether there is an occlusion or a narrowing; the spirant element is at least noticeable. This represents the minimum of $p\ t\ k$ articulation; at this point the sound is very likely, especially under conditions of race-mixture, to jump over into the group of ordinary fortis spirants, $f\ p\ \chi$. But all four of the stages up to this point represent merely varieties of one and the same ideal articulation, namely, $p\ t\ k$, and a group of persons might pass

from one stage to the other and yet believe all the time that they were still pronouncing their *ordinary* *p t k*.¹

Or again, let us take the voiced stops *b d g*. These are relatively less tense than the *p t k* group. The fortis occur e.g. in German *Flagge, Ebbe*, the lenes, with reduced tension, in *Liebe, Tage*. A further reduction of tension will give the voiceless lenes, *p̥ t̥ k̥* as in South German *Bein, dein*, etc., and these may suggest and pass over into the *p t k* group. A still further reduction of tension results in very light spirants, such as the South German bilabial spirant *v* in *was, aber*, which is described by Sievers and Viëtor as being a light voiceless glide; these lenes sounds may suggest and pass over into the voiced spirants *b̥ d̥ g̥*.

The reduced grades of the ordinary *f* and *h* articulation groups are identical respectively with the reduced grades of the *p* and *b* groups, and under circumstances may pass over into the latter. Instances of voiceless spirants becoming pure stops in Welsh and Armenian are mentioned by Pedersen, *Kelt. Gram.*, § 300: and German offers us examples of the change of voiced spirants to their corresponding stops.

May I repeat the point which I have tried to make, namely, that in any given articulation there is a definite coördination between the muscular reactions in the larynx and in the mouth, and any reduction of tension at the glottis is accompanied by a corresponding reduction at the lips, tongue, or soft palate. I believe that all the characteristic consonant-shifts of Celtic, Primitive Germanic, and High German *began* as reduced grades of the original sound, due to antagonistic muscular reaction which was called forth by an increase of *syllable* or *vowel* stress. The final form of the consonants in Primitive Germanic and High German is a matter of the substitution of a different, but suggested articulation, after they had become so far reduced as no longer to resemble their original articulation. Thus *p*, when reduced to its minimum of tension, approaches and suggests a spirant *f*. The increase of syllable stress with its consequent reduction of tension of adjoining consonants, and the substitution of the new suggested consonants, are the result of race and accent mixture. This will be made clearer by a brief statement of some facts concerning the Nordic and the Alpine races, and the type of accent which is peculiar to each.

¹ The affricatae *pf, tz, kch* are composite sounds, possibly a compromise between *p* and *f*, etc., due to race-mixture, see § 7, end.

5. NORDIC AND ALPINE RACES

Ethnologists distinguish at present three chief races in Europe: first, the tall, blond, long-skulled Nordics of northern Europe (chiefly North Germans and Scandinavians); second, the shorter and somewhat darker, round-skulled Alpines who occupy central France, southern Germany, Switzerland, Austria, and other countries to the east; and third, the Mediterranean race, which does not here concern us. The Nordics developed around the shores of the southwestern Baltic; they were the bearers of Indo-European speech. During the late Neolithic Age, while the Nordics were still living in comparative isolation in the Baltic Basin, the Alpines entered Europe from the southeast and occupied the fertile lands of the Danube, and Rhine, Weser Elbe. They possessed a superior civilization, practised agriculture, the domestication of some animals, and the art of pottery; later they also introduced bronze into northwestern Europe (1800 ? B. C.). In this period of their greatest expansion they reached Holland, northern Denmark, and southern Norway, where even today considerable traces of them are still found (cf. Ripley, *The Races of Europe*, New York 1899, pp. 277 ff.). From the Alpines the Nordics acquired the superior civilization, and then, equipped with bronze weapons, they turned on their teachers and began their remarkable career of expansion in successive waves of migration toward the south, the east, and the west. They everywhere conquered the Alpines (and, east of the Carpathians, other races), pressing many of them from the fertile valleys back into the hills and mountains, and superimposing their Nordic or Indo-European speech on them. The last two of these waves resulted in the developments which we know as *Celtic* and *Germanic* in the broadest meaning of these terms. They represent a permanent mingling of Nordics and Alpines. (The later Italics and Greeks passed on through Alpine territory and settled in the south. The Indo-Iranian and Balto-Slavic groups developed east of the Carpathians among a non-Alpine people sometimes called sub-Nordics. The present extensive broad-headedness among Slavic peoples is the result of a later slow expansion of Alpines eastward during the first eight or nine centuries A. D. See § 9.4).

The Celtic migration was first up the valleys of the Elbe, Weser, and Rhine, and into Holland (about 1000 B. C.); then across into the British Isles (800 B. C.), and also farther south into the

Main and Danube regions. As the lower valleys of the Elbe, Weser, and Rhine were vacated by the Celtic Nordics, the Alpines reasserted themselves here for a time, until they were again crowded back by the next big wave of Nordic migration (about 400-200 B.C.), the Primitive Germanic. It was during this period that the Germanic group as a unit came in contact with the Alpines (Primitive Germanic consonant-shifts). This movement did not advance very far to the south and west, but was checked and diverted to the north. No doubt the later Scandinavians formed the vanguard of this Primitive Germanic migration and represent the greatest mingling of Germanic Nordics with Alpines; being pressed from behind by their kinsmen, and unable to advance farther toward the west or south, they turned northward into Denmark and Sweden. (See § 9, 3).

After another three or four centuries, when Celtic power in central and south Germany had waned, groups of Germanic Nordics moved southward up the Rhine, Weser, and Elbe, subduing and mingling with Alpines and imposing Germanic speech on them. This language of central and south Germany which developed during the first six or seven centuries A. D. owes its chief peculiarities to the fact that it is Germanic speech in the mouth of Alpines. Whether the Alpines spoke Celtic or Roman or some aboriginal language is immaterial to our contention, as will appear in the following section.

6. NORDIC AND ALPINE ACCENT

If we examine the general type of word and sentence accent found today among Alpine peoples, French, South Germans, Austrians, and some Slavic branches, we observe a certain similarity in some general characteristics, and these are in marked contrast to the characteristics of the accent of the Nordic peoples, North Germans, English, and Danes.

The Alpine race distributes the accent more uniformly over all the syllables of a word or sentence; it does not have strongly and weakly stressed syllables standing in sharp contrast to each other; it operates nearly all of the time with a very narrow or closed glottis, hence the absence of so-called aspirated stops; it shows a tendency to conserve the supply of air, expending it in a slightly crescendo manner, as in French. The muscular contractions and relaxations are slow and gentle, not sudden and brusque.

(cf. Rousselot, p. 483.) In regard to tongue shape, it prefers the rill consonant *s* to the slit consonant *ʃ* (see Jespersen *Lehrbuch*, 3. 4).

The Nordic race, on the other hand, condenses most of the energy into one syllable, and in early Indo-European times this was generally the psychologically emphatic syllable. (Since in so many cases this accent fell on the first syllable, the Alpines generalized the type; this would explain the shift of accent to the first syllable in Celtic and Germanic.) This type of accent is characterized by sudden attack and release of articulation, by more marked contrasts of muscular tension and relaxation, by more sudden opening and closing of the glottis, hence the prevalence of aspirated stops and the glottal stop; the slit consonant *ʃ* is very common. The Alpine type might be described as a 'distributed accent,' the Nordic as a 'condensed accent.'

I do not wish to be understood as maintaining that there is any inherent or causal connection between the physical race type and the accent type; each type of accent is merely habit, and how it arose no one knows. But I do believe that there is no element of speech more stubborn, more persistent, than the general type of accent, the general manner of expending, controlling, and modifying the current of air. A thing so fundamental as the physiological functioning of the organs of speech must remain more or less constant through thousands of years and tend to reassert itself after every disturbance. The repeated superimposings of Nordic speech on the Alpines constituted such disturbances; the French have succeeded in restoring their racial speech tendency, because they have been long removed from any close national and linguistic connection with the Nordics. The South Germans, because of such connections, are still in a state of compromise between the two tendencies; the Germanic speech with its strong first syllable accent is at variance with the natural Alpine type of distributed crescendo accent; but it is undoubtedly true that in South Germany and Austria the unaccented syllables are more strongly stressed and the accented syllables less strongly stressed than in North Germany, and there is also a marked absence of the glottal stop and aspiration, as compared with North Germany (cf. Jespersen, *Lehrbuch*, 6.21). Note also the Swiss tendency to stress slightly the suffix *-li*, *Bübli*, as compared with the unaccented *-le* and *-el* forms toward the north.

There are two facts which would seem to strengthen the contention that the present Alpine type of accent is very ancient with this race: First, modern Basque accents the last syllable, without suppressing very much the other syllables. Of course, the Basque question is far from settled, but it is not improbable that here we have to do with a survival of an aboriginal Alpine accent and language; at any rate, Celtic and Basque have several points in common, especially in the formation of the verb-system (cf. Pedersen, *Kelt. Gram.*, § 22). Second, in the Brittanian branch of Celtic at an early period the last syllable of the word bore the accent, as it still does in the dialect of Vannes in Brittany; and the sound-changes in this Brittanian branch can be best explained by assuming a musical accent (cf. Pedersen, § 180). Of course, musical accent means a more uniform distribution of stress over all syllables. It looks as though in this case the Alpine accent had prevailed over the Nordic, and this is very significant when taken in connection with the fact that the Brittanian Celts (Welsh) were the more easterly branch and remained on the continent among Alpines three or four centuries longer than did their Gaelic kinsmen (Irish).

7. ACCENT AND CONSONANT-SHIFTS

If we examine the consonant-shifts in the light of the foregoing remarks, we shall find that just those things happened which we should expect to happen under the given conditions. My understanding of the different acts is as follows. About 1000-800 B. C., a group of Nordics, bearers of Indo-European speech, moved out from North Germany westward and southward into the Elbe, Weser and Rhine valleys, conquering and mingling with the Alpine population and imposing their language on them. This development we call the Celtic. The Alpines with their peculiar type of distributed crescendo accent did not find it easy to reproduce the Nordic speech in which the greater part of the energy was condensed into one syllable, frequently the first syllable of the word. In order to reproduce this new type of accent, they had to put forth an *unusual* effort, had to bring an *unaccustomed* amount of energy into the one syllable, i.e., they had to pronounce the vowel of the syllable, which represents the culmination of the energy, with unusual tension of the vocal cords and tongue and lip muscles. This unusual effort called forth an antagonistic muscular reaction both *before* and *after* the main contraction

(especially *after*), i.e., from the point of view of the main contraction there was a preliminary and a following relaxation of the vocal cords and naturally also of the coördinated mouth muscles. This relaxation fell on the consonants before and *especially after* the vowel, resulting in their less tense articulation. In its less pronounced form, this muscular relaxation before and after a strong contraction produces merely the so-called aspirated stops of North German, Danish, and English; but in connection with an unaccustomed effort it may assume larger proportions, the opening may encroach more and more on the consonant occlusion, until finally the former occlusion becomes a slight narrowing. This is the phenomenon known as 'lenition' or 'aspiration' in Celtic. (Cf. Pedersen, *Kelt. Gram.*, § 295, and Thurneysen, *Handbuch des Altirischen*, § 115.) Lenition is defined by Celtists as a reduction of muscular tension on the consonant, a more open position of the mouth, a less firm occlusion; thus, *p t k, b d g* following the accented vowel were pronounced as very lenes homorganic spirants. The same thing occurred initially when the preceding word ended in a vowel. It is to be noted that in Old Irish initial *p > f > h* and then disappeared entirely, as *athir*, Lat. *pater*. According to Pedersen, §§ 300 and 303, the beginnings of lenition reach back to about 800 B. C., and the phenomena were originally identical in both the Gaelic and Brittanian branches.

This Nordic colonization movement known as the Celtic was a very powerful one. During the next two or three hundred years, South Germany, Switzerland, France, and the British Isles were Celtized. As the Celtic Nordics moved southward, the Alpines, no doubt, moved in and reoccupied the valleys of the Weser, Elbe, and Rhine. Whether at this time they had all accepted Celtic speech, or a part of them had retained their original languages or dialects, it is impossible to say. But that is immaterial; the important point is that their racial habit of accent has always tended to reassert itself. And so, when about 400 B. C. the next waves of Nordic colonists, those known to us as the Germanic group, began to move out, following the same courses as their Celtic predecessors, they too came in contact with an Alpine population and Alpine speech-habits. The Primitive Germanic consonant-shifts were in their beginnings identical with Celtic lenition. We say that *p t k > f b x*, but what probably happened was that the stops after and before strongly stressed vowels were

pronounced with such reduced muscular tension that one could scarcely tell whether there was a light occlusion or a narrowing; the Alpines themselves undoubtedly thought they were still pronouncing *p t k*, but to the Nordic ear the sounds were rather spirants, and so they substituted for these weakened stop-spirants their ordinary fortes spirants *f þ χ*. Quite similar to this is the present practice in North Germany of substituting the familiar *f* initially for South German *pf*, as *Fund*, *Fad*, for *Pfund*, *Pfad*. I believe that this is the way in which the stops passed over into spirants. The change involved first a decrease, then an increase of muscular tension, for the ordinary fortes spirants are undoubtedly pronounced with about the same degree of tension of the mouth muscles as their corresponding stops; it is only the very lenes stop-spirants, the minimum of *p t k* articulation described in § 4 that represent a *reduction* of tension. The reduction of tension is due to an antagonistic reaction, of which the strengthened air-current is the result, not the cause; and the later increase of tension represents a substitution of a new suggested articulation.

Let us examine another group of Primitive Germanic consonant-shifts: *b d g > p t k*. This was also the result, first, of a reduction of tension followed by a Nordic substitution of a different but suggested articulation. If the *b d g* were voiced fortes stops, they were first reduced to voiced lenes, then to voiceless lenes, as we hear them today in South Germany. To the Nordic ear the element of *voicelessness* was the striking one, and so they substituted here their ordinary *p t k*, which were in all probability aspirated voiceless stops as at the present time.

There remain to be treated the aspirated voiced stops *b^h d^h g^h*. It will be recalled that no mention was made of such sounds in § 4. Jespersen finds no place for them in his *Lehrbuch der Phonetik*, and I am inclined to believe that there is no such thing; aspiration and voicing are almost contradictory terms. The glottis narrowed for a voiced consonant and for a following vowel has no opportunity to emit an aspiration. Prokosch states in the Introduction to his *Sounds and History of the German Language* that in his opinion the so-called mediae aspiratae were voiceless spirants *f þ χ*. I believe they were either this or voiceless or partly-voiced lenes stops. Let us assume for a moment that they were voiceless spirants. An ordinary labiodental *f*, e.g., would be reduced in the Alpine pronunciation to a lenis bilabial *f*, and this lenis lip

articulation would sound to a Nordic nearer to his voiced spirant δ or his voiced stop b ; and this is just what we find in Primitive Germanic. But if they were aspirated stops or lenes stops, then a reduction of tension would give, e.g., a light bilabial v (South German w), which would be replaced either by the Nordic labiodental δ or the labial stop b .

The third wave of migration occurred during the first few centuries of the Christian era, and resulted in the Germanizing of South Germany and the rise of the High German dialects. The phenomena of the consonant-shifts are almost identical with those of the preceding periods: $p\ t\ k > f\ z (< \beta?)\ \chi\ (ch)$, or $\beta f, tz, kch$; $b\ d\ g > p\ t\ k$; $\delta\ \gamma > b\ g$ (δ had become d also in North Germany).

The differences in the Celtic, Primitive Germanic, and High German shifts I would explain as follows. After the Celtic migration southward, the political and linguistic connection with the north was not kept up, as is evidenced by the great difference between Celtic and Germanic speech. The relatively small number of Nordics was gradually submerged in the large Alpine population; hence the persevering of the Alpine lenes stop-spirants and the failure of the Nordic substitutes, the fortes spirants and stops, to assert themselves in Celtic. In the second wave of migration, the Germanic conditions were just reversed; the Nordics did not penetrate very far into Alpine territory; the movement was gradually checked and diverted back northward (Scandinavians) and eastward (Goths); the closer connection with the Alpines was not kept up, and the new speech-sounds which had resulted from the mingling of the two races persisted only in the form of their Nordic substitutes. In the third wave, the High German migrations, the Nordics came southward in such numbers that there was a real mixing of the two races, not an absorption of the Nordic by the Alpine; the consonants resulting from the mixture represent a kind of compromise: the lenis post-dental stop-spirant, the reduced grade of t , became in time a fortis spirant, but it was an Alpine *rill* spirant s , not a Nordic *slit* spirant β . Prokosch calls this *Celtic* influence; I would call it rather *Alpine* influence. Again, $\beta f, tz$ are newly developed composite sounds and represent the attempt to hold on to the Nordic stop, and at the same time the Alpine's inability to reproduce the Nordic aspiration; the Nordic's sudden glottal opening became in the Alpine mouth a slow and regular spirant opening f, s , hence the compound sounds

pf, *tz*. (cf. § 6). In the velar row, the greater rigidity of the back part of the tongue is not favorable to the development of an affricative, and so we have here generally the aspirated stop.

8. UMLAUT AND CONSONANT-INFLECTION

The consonant-shifts have been explained as the result of antagonistic muscular reaction which arose from the clash of the Nordic and Alpine types of accent. The theory of accent-mixture offers us also a plausible explanation of the phenomenon of umlaut and consonant-infection, although the physiological principle involved is a different one. By infection, we mean the coloring of a consonant according to the mouth position of the following vowel, a phenomenon which is common in Celtic and Slavic, and which probably existed in Germanic speech at the time of the rise of umlaut. Prokosch holds (*Sounds and History of the German Language*, p. 146) that umlaut is non-Germanic, and attributes it to Celtic influence. I would modify this statement by saying that it is non-Nordic, non-Indo-European; but it is perhaps equally true that umlaut and consonant-infection are also non-Alpine in aboriginal Alpine languages; they are rather the result of the *mixing* of the two types of accent. Let us see what would be likely to happen if a person with the Alpine accent is called upon regularly to reproduce the Nordic accent, if, instead of saying, e.g., *fáris*, about as in modern French, he has to say *fáris*. It is a fundamental proposition of psychology that every chain of physiological reactions representing a mental unit tends to express itself fully, to realize its goal, and this of course in the natural habitual manner of the individual's functioning. Furthermore, in every chain of muscular reactions, there is a dominant element, a moment of maximum contraction, and around this the other elements group themselves as subordinates. Now when the Alpine reverses his normal form of reaction, and puts into the first syllable the bulk of the stress, thus forcing an element of the chain to become the dominant which is for him not the normal dominant he is still unable fully to abandon his normal dominant; the vowel *i*, in such a series as *faris*, partially preserves its old domination, continues to exert a strong influence on the reaction chain of which it is a part, and even when trying to suppress it or get away from it, he will unconsciously run off into it or at least part way toward it. In the language of psychology, this muscular reaction represents

the lowest degree of resistance, and is liable to be set off before its time by any other reaction that comes near it. Now any accented vowel does come physiologically so near that its muscular reaction runs off into the reaction for *i*, thus coloring the quality of the first vowel and naturally also of the intervening consonant. Thus we may say that umlaut results from the forced substitution of a new unnatural dominant for the old, habitual, natural dominant; the muscular reaction of the vowel which he *must* accent glides off into the reaction corresponding to the vowel which he unconsciously *wants* to accent. The infection (palatalizing or velarizing) of the consonant is merely incidental, because it is in the way, it intervenes between the two vowel reactions which he cannot keep apart. (In a combination such as *mah-ti*, the velar spirant, being an integral part of the syllable *mah*, strengthens the velar reaction of *a*, and thus offers an obstacle to the *i*-reaction, but in time this is overcome.) The vowel of the final syllable loses its independence, it gets over into the first syllable, and the result is either a vowel with a glide (Slavic, Celtic, French), or a new vowel which represents a muscular compromise between the two original reactions (German): *a* > *e* (halfway between *a* and *i*), *u* > *ii*, *o* > *ö* (tongue contraction of *i*, *e*, lip contraction of *u*, *o*), *farit* > *ferit*, with a weakened *i*, > *fährt*; *wurfil* > *würfel* (*würfl*). After the new vowel is firmly established, and the vowel of the final syllable has disappeared or weakened, the infection of the consonant may be abandoned, as in Germanic, or retained, as in Celtic and Slavic.

Umlaut was induced by *j* as well as by *i*; *nasjan* > *nerien* > *nähren*. There is a physiological and also a psychological basis for the dominance of *j*. (a) Physiologically, the South German (Alpine) *j*-sound is an *i*-glide, it is more vocalic, more syllabic than the North Germanic *j*, which is a narrow spirant; the Alpine accent would be *na-si-an*, with crescendo tendency, rather than *nás-jan*. (b) But especially psychologically is the *j* dominant because in suffixes it is the sound element with which often a definite meaning is associated; e.g., *-jan* made *causative* verbs, *nasjan*, *satjan*; *-jan* made names of *agency*, *arbjo*, *erbeo*, *erbe*, one who inherits; *gisellio*, *geselle*, one who occupies the same room (Saal). All that has been said of *i*, *j* umlaut applies equally to *u*, *w* umlaut of Celtic, Slavic, and Old Norse. Why it did not occur also in High German I do not know.

The weak point in Sievers' and Wundt's explanations of umlaut is that they do not give a *reason* for the potency of the unaccented *i, j* of the final syllable. I believe that my explanation offers a plausible reason, and cures this defect.

9. CONCLUDING REMARKS

1. In the discussion of consonant-shifts, no mention was made of consonants in the neighborhood of unaccented vowels, e.g., Primitive Germanic pp. *haðanā* < *capanā* (Gothic *háfjan*, Latin *cápío*). Such cases are rare. There are two possible explanations: (a) they are the result of a generalizing of the new consonants; (b) in unaccented syllables, the whole articulation, both of vowels and consonants, is with very slight tension; *p t k*, e.g., are reduced to the minimum of tension and suggest and pass over into the spirants. For a discussion of Verner's Law, cf. Prokosch, *JEGPh.*, 11, 1 ff., and author, *JEGPh.*, 14, 348.

2. In the Germanic languages, umlaut appears later than the consonant-shifts, and no doubt this was the case also in Celtic. This is just what we should expect. In the beginning of the contact of the two races the attention of the Alpine is centered strongly on the new syllable to be accented; this calls for unusual effort, and the antagonistic muscular reaction connected with this results in the shifting (weakening) of the consonants. Later on, when the old type of accent begins to reassert itself, the last syllable of the word tends to force itself more and more into the dominant position, and the result is umlaut and consonant-infection.

3. The fact that umlaut is more extensive (labial) in Norse than in other Germanic dialects, I would explain in this way: in the first westward and southward movement of the Germanic group (about 400 B. C.), the vanguard consisted of those who later became the Scandinavians. This movement was checked and diverted toward the north, but the umlaut tendency had already been given by the contact with Alpines.

4. If asked why Slavic exhibits umlaut and consonant-infection, but not the consonant-shifts, I would say that Slavic first developed east of the Carpathians among a non-Alpine people, a people sometimes designated as sub-Nordic. Present broadheadedness among Slavs is due to a later *slow* infiltration of Alpines from the southwest during the first eight or ten centuries of the Christian era. What happened here was just the reverse of what occurred during

the Celtic and Germanic migrations. It was not a case of the sudden imposing of a new language on a whole Alpine population, but rather the very gradual adopting of the language by the Alpines in their slow expansion eastward. The two types of accent were not brought into such sudden and sharp conflict with each other. This difference in the two processes of race-mixture may possibly account for the failure of the consonants to shift. Furthermore, the sub-Nordic accent was perhaps less condensed than the pure Nordic, and the contrast between it and the Alpine was not great enough to call forth antagonistic muscular reaction. But the difference in the *position* and general *direction* (*diminuendo*) of the accent, which must have existed in a large number of words, was sufficient to cause the umlaut and consonant-infection (especially palatalizing).

5. This theory of accent-mixture seems to be plausible for the following reasons: (a) In the High German consonant-shifting (and here we are best informed as to the geography of the events) the characteristic changes did not take place and have not yet taken place in North-West Germany and Denmark, in territory that for two thousand years has not ceased to be Germanic; on the other hand, the changes did occur just in proportion as Nordics mingled with Alpines. What is true of the High German period seems to be equally true of the Celtic and Primitive Germanic periods. I cannot avoid the conviction that the clash of the two types of accent was the cause of the shifts. In answer to the objection that the Danish aspirated stops furnish us an instance of a spontaneous shift now taking place, I would say that Danish represents merely the extreme form of Nordic accent, that the stops are highly aspirated, but that we are not justified in predicting that they will ever pass over into anything else; at least they have not done so in two thousand years of isolation. (b) The theory offers a single explanation for consonant-shifts, umlaut, and infection in Celtic, Germanic, and Slavic. (This theory does not affect Prokosch's view of the development of accented vowels in the direction of increase in tension: it merely assigns a different *reason* for the increase.) (c) The ancient language of the Longobards of northern Italy, a Germanic dialect in the mouth of Alpines, exhibits practically the same consonant-shifts as the High German. (d) Some of the most characteristic consonant changes of French and Raetoromanic (two Alpine

developments of Latin with its condensed Nordic accent) rest upon the same principle, namely, a decrease of muscular tension in the neighborhood of accented vowels, due to antagonistic reaction: Old French *patre* > *padre* > *padre* > *père*; *sapone* > *sabone* > *savon*; *securu* > *seguru* > *sejur* > *sur*; i.e., voiceless fortes became lenes, then lenes spirants, and either disappeared or jumped over into a new but suggested articulation. Raetoromanic *fudurum* < *futurum*; *ebistola* < *epistola*; *logus* < *locus*; i.e., the voiceless fortes became voiceless lenes, written *b d g*. Kaufmann, *ZfdP.* 46, p. 360, contends that the South German voiceless lenes arose under the influence of these Raetoromanic voiceless lenes. But whence the Raetoromanic voiceless lenes from Latin fortes? I maintain that both originated in the same manner and from one common cause: in each case, we are dealing with Nordic accent in the Alpine mouth. (Latin, like German, accents one syllable strongly.) In each case, the voiceless lenes resulted from a decrease in muscular tension due to an antagonistic reaction; in Upper German, voiced stops became voiceless lenes stops, and in Raetoromanic, voiceless fortes became voiceless lenes stops. The changes in orthography, in the one case from *b d g* to *p t k*, and in the other from *p t k* to *b d g* merely indicate the effort to represent the *voiceless lenes*. (e) French, in its development of postconsonantal *j*, exhibits a phenomenon which is physiologically identical with the consonant-infection and umlaut of Celtic, Germanic, and Slavic; e.g., *potjone* > *potsjone* > *poison*; *batalja* > *bataille* (*bataj*, or *bataⁱ*), *montanja* > *montagne* (*montaⁱgne*).

C. M. LOTSPEICH.

University of Cincinnati.